III-N semiconductors for quantum nanoelectronics and photovoltaic

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ABSTRACT

III-Nitride semiconductor materials are a major class of compound semiconductors with important commercial applications. Most prominent ones are light emitting diodes (LEDs) used in lighting and high power/frequency transistors for radars. The former are based on indium-gallium nitride alloys (InGaN) with relatively low InN content (<0.25) while the latter employ aluminum-gallium nitride (AlGaN) heterostructures.

The material properties of III-Nitrides hetero(nano)structures renders them particularly interesting for many future advanced applications, but important bottleneck challenges need to be addresses to unleash their full potentials.

In this poster presentation we will summarize the advantages, the challenges and our efforts to overcome them for future III-N applications in (1) spin qubits and quantum processors and (2) high efficiency and low cost to efficiency ratio photovoltaic cells.